

Cases of metabolic acidosis in CTG+ST group not requiring special neonatal care

Cases

LDA 0219	2
MAB 261	4
MAD 213	6
MAD 317	8
MAD 386	9
MAE 311.....	11
MAF 218.....	13
OEE 307.....	15
OEE 362.....	17
OEE 367.....	19

LDA 0219

Clinical data

Para 0. Normal pregnancy, Spontaneous onset of labour after 38 weeks of gestation
Clear liquor, Epidural + Pethidine. Augmented labor. Maternal pyrexia of unknown origin, temp $>38.5^{\circ}\text{C}$.

Active pushing commenced at 01:08
NVD at 01:15

Neonatal data

Female: 3735 g

Apgar: 5-8-10

Cord artery: pH 6.93
 PCO_2 7.97 kPa
BDecf 17.5 mmol/l

Cord vein: pH 6.97
 PCO_2 9.3 kPa
BDecf 13.8 mmol/l

Neonatal outcome

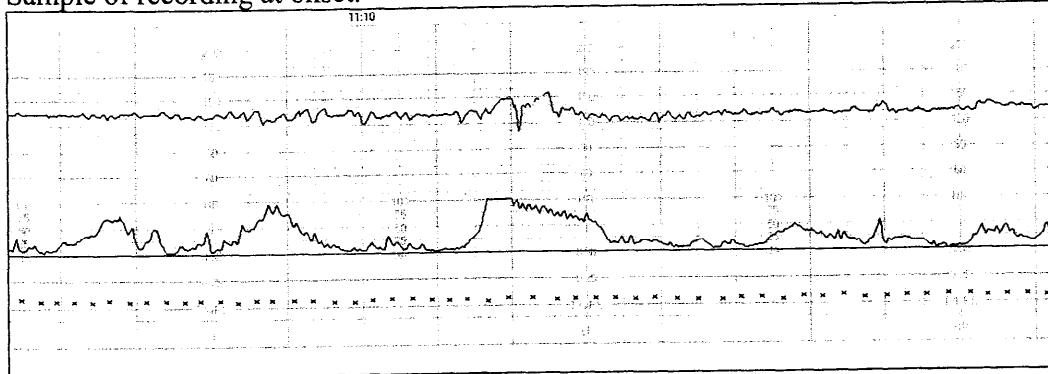
Normal neonatal outcome.

Assessment of recording

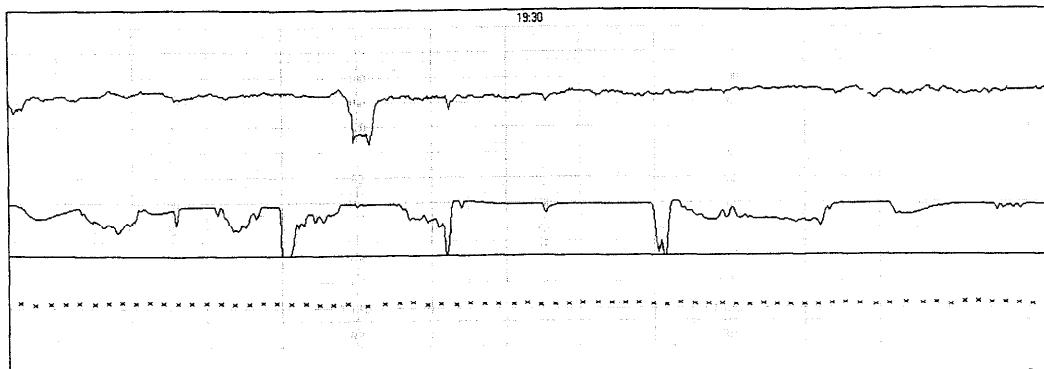
Onset of recording:  at 10:38

End of recording:  at 01:15

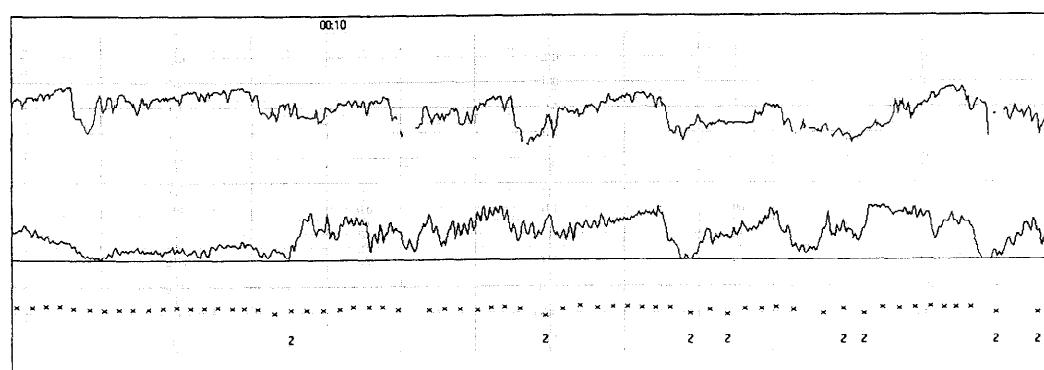
Sample of recording at onset.



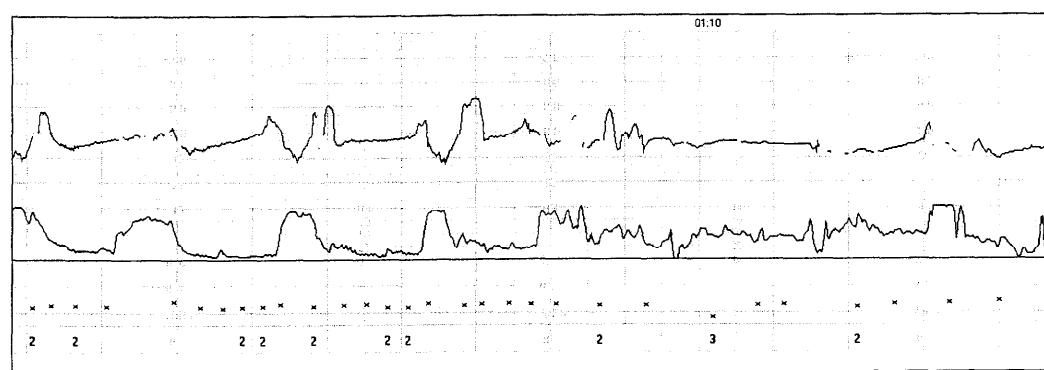
Tachycardia noted at approx 19:30 in conjunction with maternal pyrexia.



Biphasic ST changes were noted as the FHR pattern changed with the onset of complicated variable decelerations.



These ST changes continued until delivery. The FHR pattern showed a decrease in baseline FHR with reduced variability.



Comments

Normal pregnancy but maternal pyrexia of unknown cause. Approx 1 hour before delivery, onset of biphasic ST changes informing that the myocardium was affected. Cord artery PCO₂ is lower than the cord vein PCO₂ indicating late clamping. However, the cord vein sample appears accurate and indicates cord metabolic acidosis. Maternal pyrexia, fetal heart rate changes, biphasic ST and cord vein metabolic acidosis but an unaffected neonate may indicate a fetus responding to a situation of increased metabolic demand from increased temperature more than severe hypoxia per se.

MAB 261

Clinical data

Para 0. Normal pregnancy. Spontaneous onset of labour after 42 weeks of gestation

Meconium. Augmented labor

Active pushing commenced at 01:30

Mid cavity vacuum at 02:22 for failure to progress

Neonatal data

Male: 3850 g

Apgar: 5-8-8

Cord artery: pH 6.92

PCO₂ 8.30 kPa

BDecf 17.6 mmol/l

Cord vein: pH 7.05

PCO₂ 7.30 kPa

BDecf 13.5 mmol/l

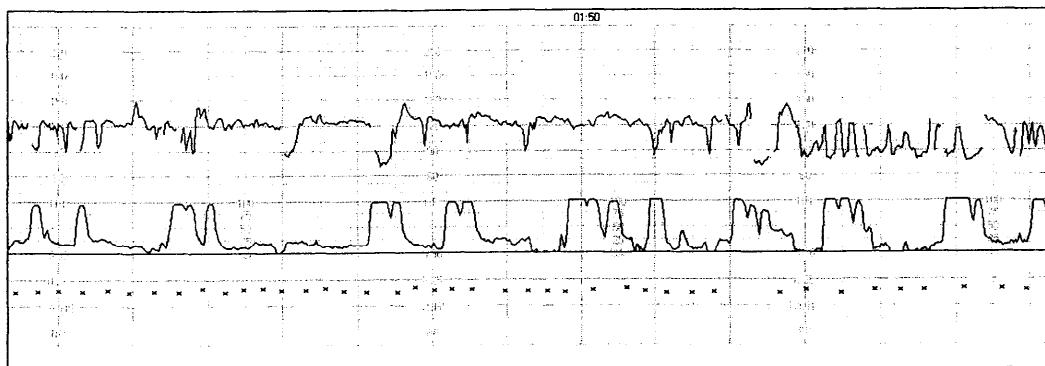
Neonatal outcome

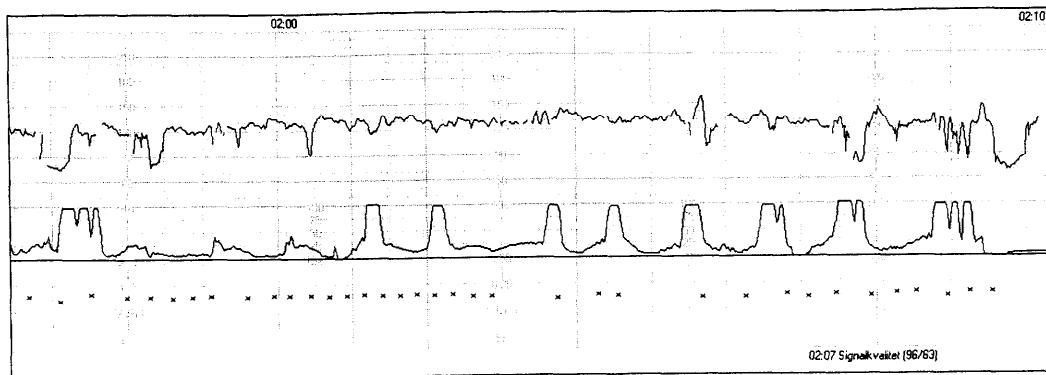
Normal neonatal outcome.

Assessment of recording

Onset of recording at 01:50 at 07:10.

End recording at 02:10 at 02:10.





Frequent uterine contractions during active pushing in 2nd stage. Normal ST with variable deceleration occurring during end of 1st stage.

Comments

Nothing to indicate marked intrapartum hypoxia. Obviously, events after discontinuation of recording – 12 minutes without data might have been the cause for the acidemia.

MAD 213

Clinical data

Para 1. Spontaneous onset of labour after 37 weeks of gestation,
Clear liquor
Active pushing commenced at 14:40
Outlet vacuum for threatening asphyxia according to CTG+ST at 20:23.

Neonatal data

Female:

Apgar: 4-8-9

Cord artery: pH 6.92
 PCO₂ 12.18 kPa
 BDecf 12.2 mmol/l

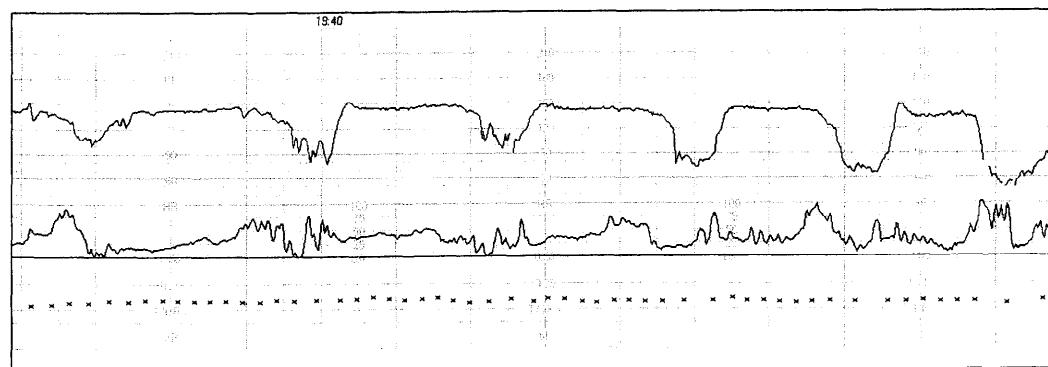
Cord vein: pH 6.98
 PCO₂ 10.29 kPa
 BDecf 11.9 mmol/l

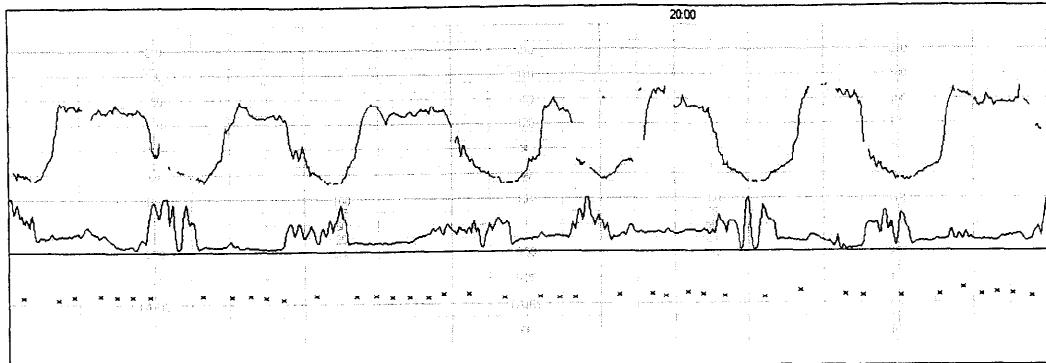
Neonatal outcome

Normal neonatal outcome.

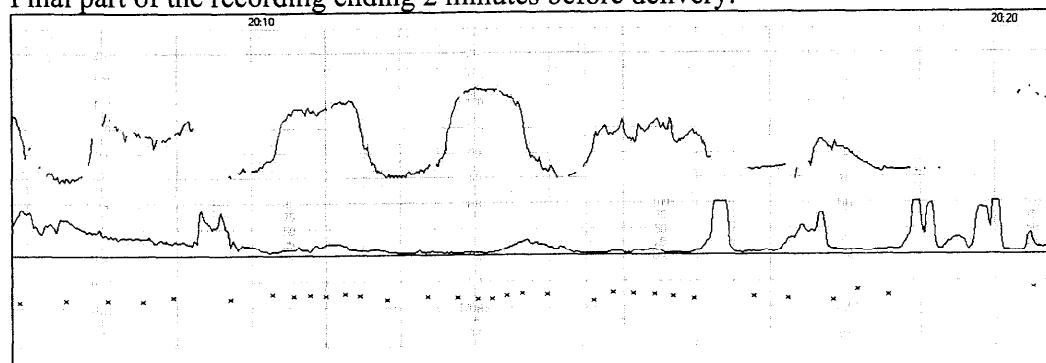
Assessment of recording

Normal FHR pattern until active pushing starts. At this point in time, variable decelerations commence. Normal baseline FHR.





Final part of the recording ending 2 minutes before delivery.



Comments

Events occurring during 2nd stage of labor indicating intermittent cord compression. Such patterns would be associated with a reduction of peripheral blood flow and a metabolic acidosis predominantly generated from those tissues. The high PCO₂ readings are associated with these decelerations and intermittent cord occlusions. The T/QRS data show an increase during the last 10 min of labor.

The staff responded accurately to the situation.

MAD 317

Clinical data

Para 0. Normal pregnancy, Spontaneous onset of labour after 41 weeks of gestation

Clear liquor.

Active pushing commenced at 23:20

Mid cavity vacuum for threatening asphyxia according to CTG at 23:44

Neonatal data

Male: 3370 g

Apgar: 6-10-10

Cord artery: pH 6.93

PCO₂ 10.67 kPa

BDecf 13.8 mmol/l

Cord vein: pH 7.13

PCO₂ 7.82 kPa

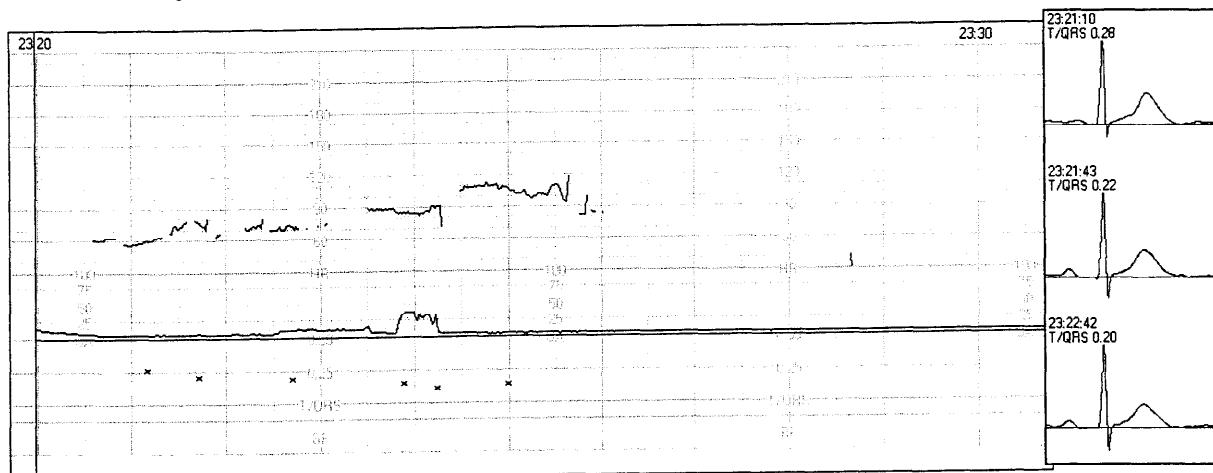
BDecf 8.4 mmol/l

Neonatal outcome

Normal neonatal outcome.

Assessment of recording

Five minute recording during 2nd stage. Inadequate duration and finishing 18 min before delivery.



Comments

The FHR trace indicates recovery after a prolonged deceleration. T/QRS show a return from high values ($T/QRS > 0.25$), which would indicate that a significant event occurred immediately prior to the onset of the recording.

MAD 386

Clinical data

Para 1. Induction of labour for maternal reasons after 41 weeks of gestation

Clear liquor. TNS + Pethidine.

Active pushing commenced at 03:50

Outlet Vacuum for threatening asphyxia according to CTG+ST at 04:29

Neonatal data

Male: 3960 g

Apgar: 7-9-10

Cord artery: pH 7.02

PCO₂ 6.85 kPa

BDecf 15.7 mmol/l

Cord vein: pH 7.17

PCO₂ 9.22 kPa

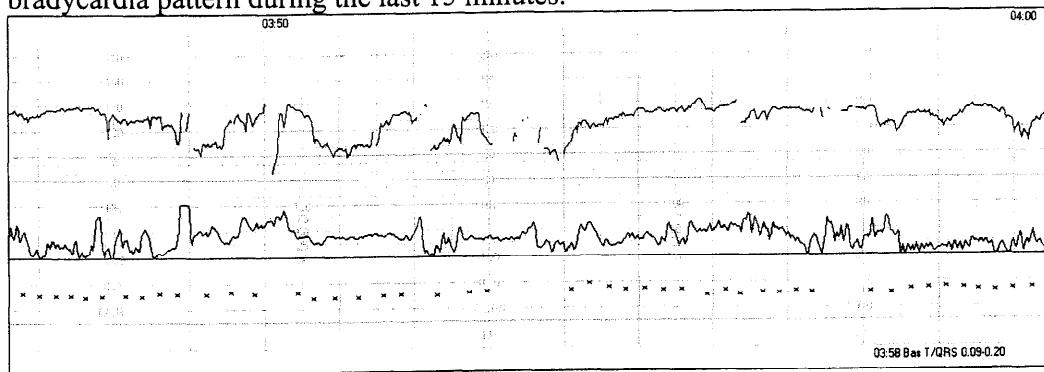
BDecf 2.7 mmol/l

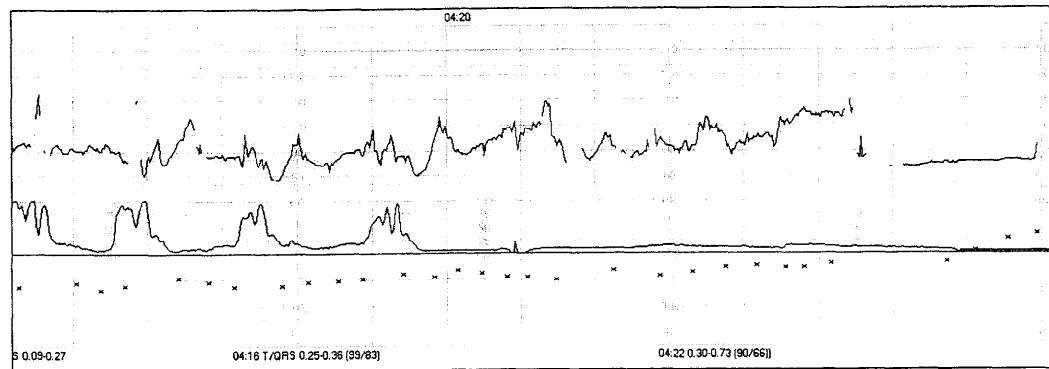
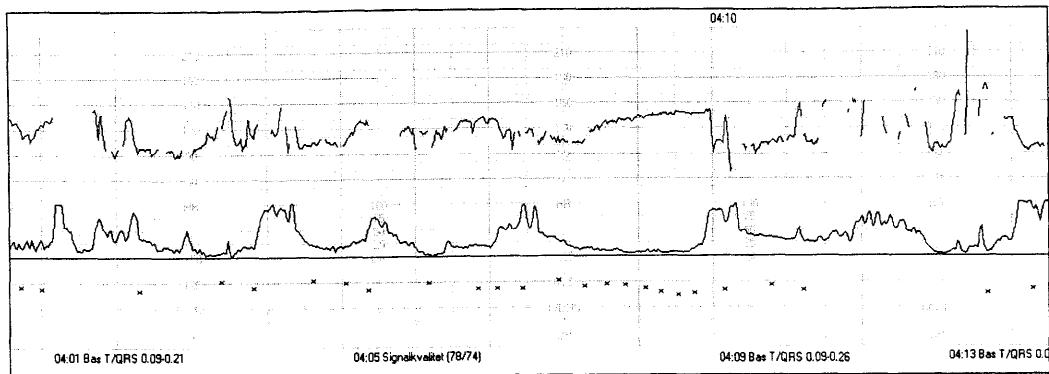
Neonatal outcome

Normal neonatal outcome.

Assessment of recording

Normal FHR pattern until onset of active pushing. At this point in time, variable decelerations are noted, becoming complicated at 04:02. Baseline FHR show a bradycardia pattern during the last 15 minutes.





The ST log indicated a sign T/QRS rise at 03:38, (baseline T/QRS rise of 0.11) in association with an intermediary FHR pattern.

Comments

Firstly, one should notice that cord acid base data indicate late clamping with loss of PCO₂ from the cord artery (6.85 vs 9.22 kPa) thereby overestimating the degree of metabolic acidosis in the cord artery (BDecf 15.7 vs 2.7 mmol/L). Secondly, there was a delay in responding to the CTG+ST information by approx 20 minutes.

MAE 311

Clinical data

Para 0. Normal pregnancy. Spontaneous onset of labour after 38 weeks of gestation
Clear liquor, Augmented labor. Epidural.

Active pushing commenced at 02:10

Outlet vacuum for threatening asphyxia according to CTG+ST at 03:28

Neonatal data

Female: 3700 g

Apgar: 6-8-10

Cord artery: pH 6.99
PCO₂ 7.78 kPa
BDecf 15.4 mmol/l

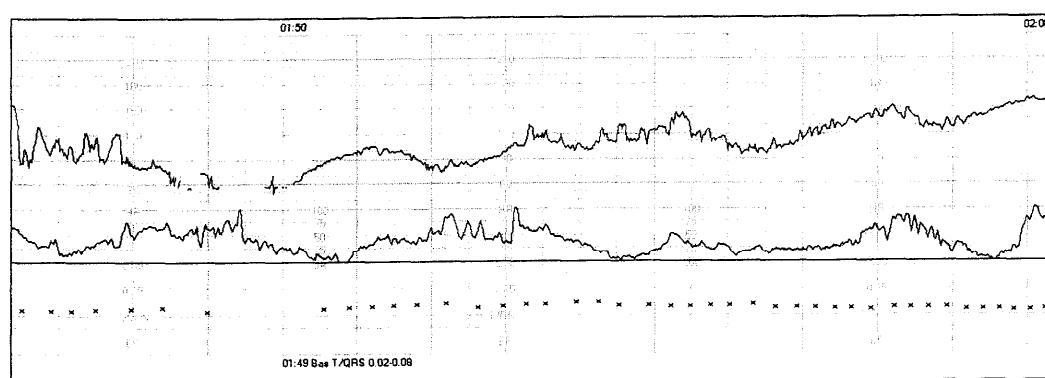
Cord vein: pH 7.02
PCO₂ 9.71kPa
BDecf 10.7 mmol/l

Neonatal outcome

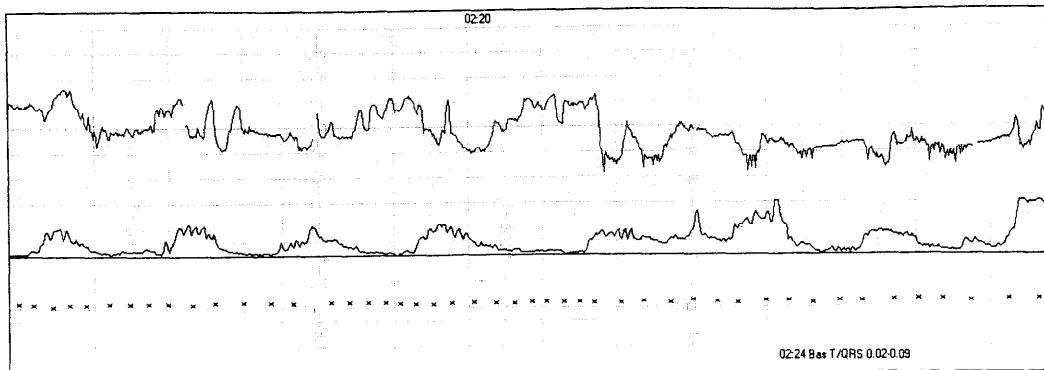
Normal neonatal outcome.

Assessment of recording

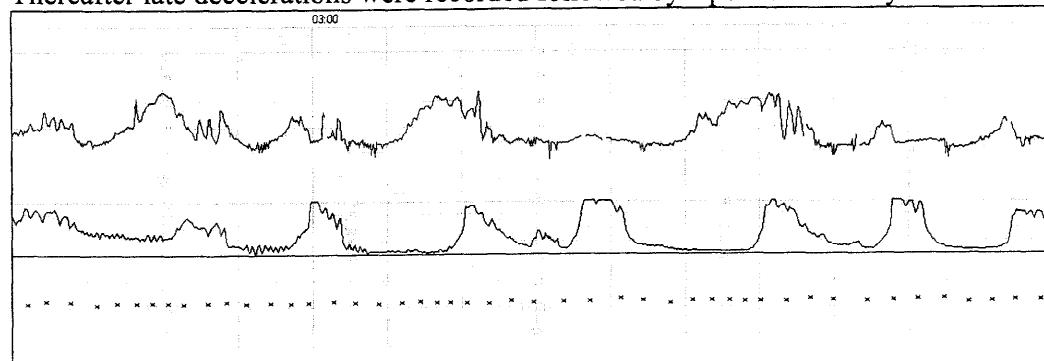
Normal FHR pattern until 01:50 when a marked deceleration occurred in association with frequent contractions. A T/QRS baseline rise was indicated as well.



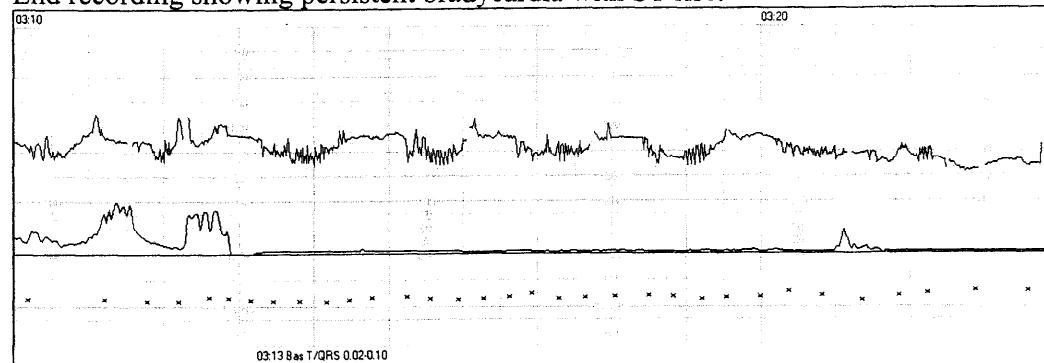
This pattern was repeated at approx 02:20 with the onset of active pushing.



Thereafter late decelerations were recorded followed by a persistent bradycardia.



End recording showing persistent bradycardia with ST rise.



Comments

Firstly, one should notice that cord acid base data indicate late clamping with loss of PCO₂ from the cord artery (7.78 vs 9.71 kPa) thereby overestimating the degree of metabolic acidosis in the cord artery (BDecf 15.4 vs 10.7 mmol/L). Secondly, there was a delay in responding to the CTG+ST information by approx 1 hour. Although, these initial events did not persist, they indicated a reduced ability of the fetal placental unit to meet with the demand of labor and an intervention was required.

MAF 218

Clinical data

Para 0. Normal pregnancy. Spontaneous onset of labour after 39 weeks of gestation

Clear liquor, pethidine, augmented labor.

Active pushing commenced at 17:30

Normal vaginal delivery at 18:23.

Neonatal data

Male: 3655 g

Apgar: 8-9-10

Cord artery: pH 7.01
PCO₂ 8.42 kPa
BDecf 13.4 mmol/l

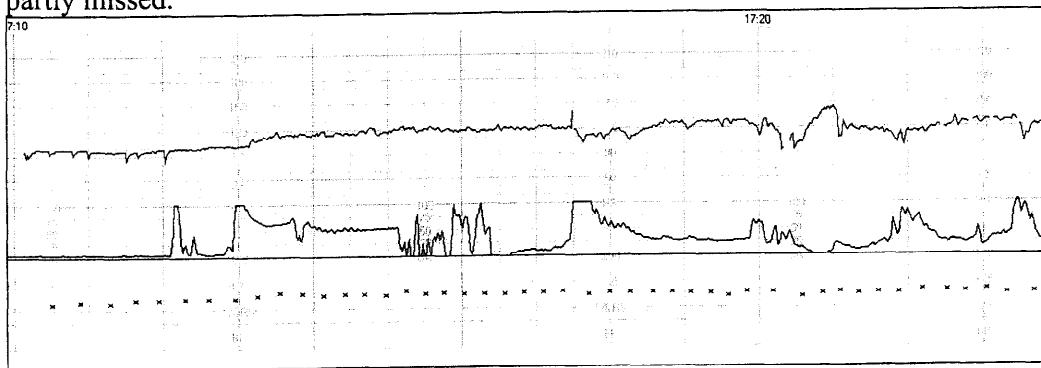
Cord vein: pH 7.15
PCO₂ 6.04 kPa
BDecf 11.5 mmol/l

Neonatal outcome

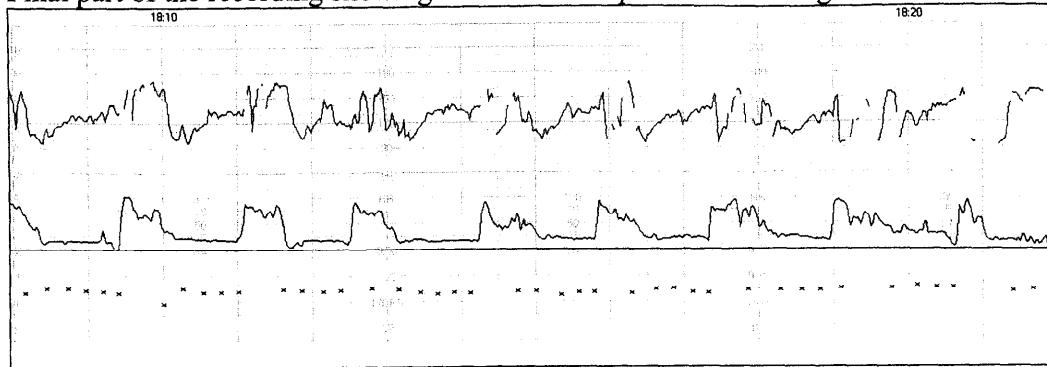
Normal neonatal outcome.

Assessment of recording

The recording starts with a bradycardia followed by a recovery in baseline FHR. In parallel there is a rise in T/QRS indicating a significant hypoxic episode that was partly missed.



Final part of the recording showing a normal FHR pattern in 2nd stage with stable ST.



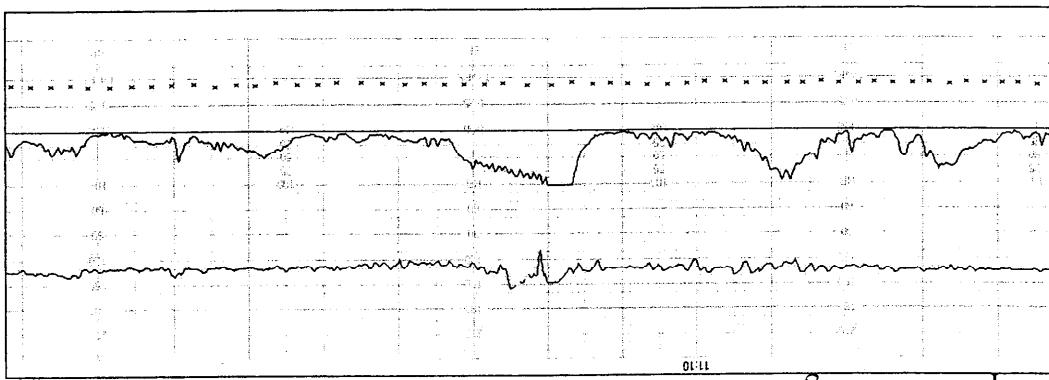
Comments

A case of cord artery metabolic acidosis and a vigorous neonate. CTG+ST indicates the possibility of some hypoxic episode at onset of recording.

Cases of metabolic acidosis in CTG+ST group not requiring special neonatal care

Cases	
LDA 0219	2
MAB 261	4
MAD 213	6
MAD 317	8
MAD 386	9
MAE 311.....	11
MAF 218.....	13
OEE 307	15
OEE 362	17
OEE 367.....	19

Tachycardia noted at approx 19:30 in conjunction with maternal pyrexia.



Sample of recording at onset.

Onset of recording: at 10:38
End of recording: at 01:15

Assessment of recording

Normal neonatal outcome.
Neonatal outcome

APgar: 5-8-10
Female: 3735 g
Cord artery: pH 6.93
PCO₂ 7.97 kPa
BDeCf 17.5 mmol/l
Cord vein: pH 6.97
PCO₂ 9.3 kPa
BDeCf 13.8 mmol/l

Neonatal data

NVD at 01:15
Active pushing commenced at 01:08
origin, temp > 38.5°C.

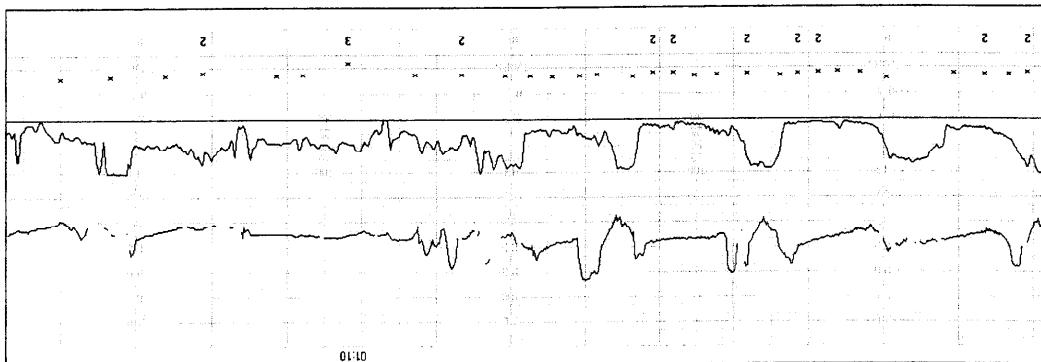
Para 0. Normal pregnancy, Spontaneous onset of labour after 38 weeks of gestation
Clear liquor, Epidural + Petidime. Augmented labour. Maternal pyrexia of unknown

Clinical data

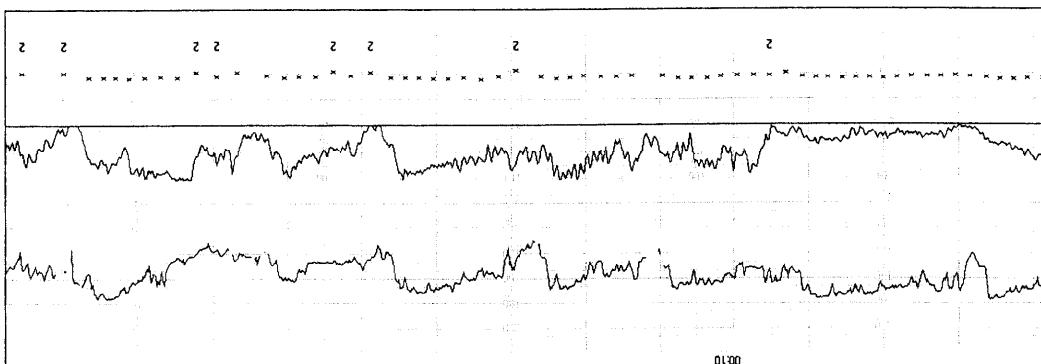
LDA 0219

hypoxia per se. Situation of increased metabolic demand from increased temperature more than severe metabolic acidosis but an unaffected neonate may indicate a fetus responding to a metabolic acidosis. Maternal pyrexia, fetal heart rate changes, biphasic ST and cord vein acidosis. Cord artery PCO₂ is lower than the cord vein PCO₂ indicating late clamping. Cord artery, onset of biphasic ST changes informing that the myocardium was affected. Normal pregnancy but maternal pyrexia of unknown cause. Approx 1 hour before delivery, onset of biphasic ST changes indicating late clamping.

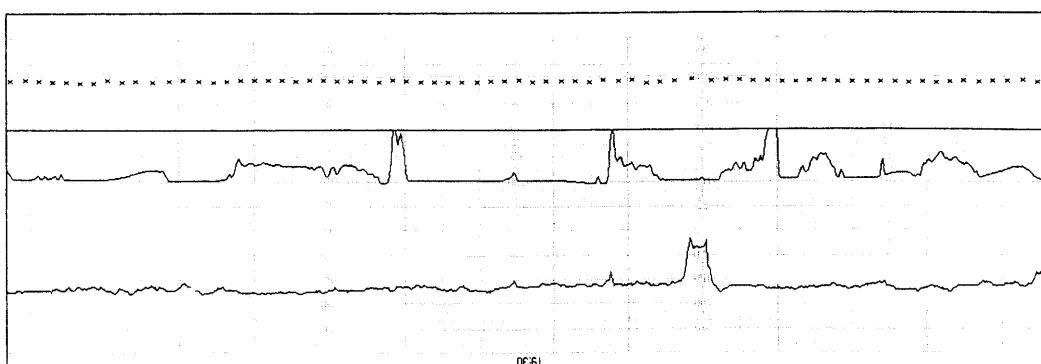
Comments

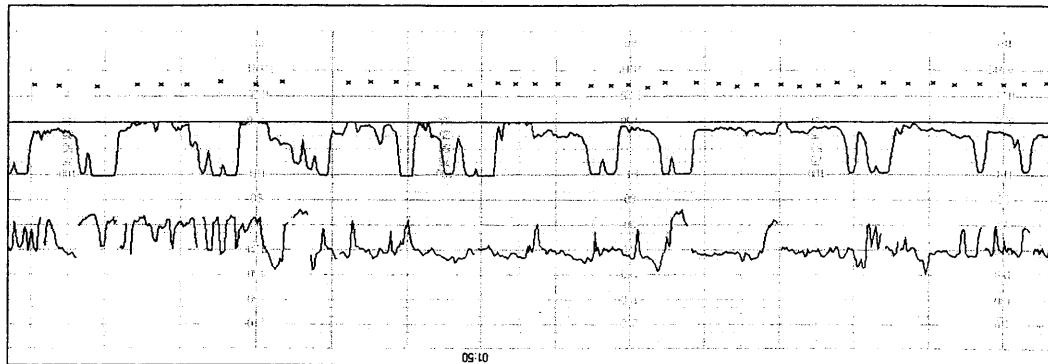


These ST changes continued until delivery. The FHR pattern showed a decrease in baseline FHR with reduced variability.



Biphasic ST changes were noted as the FHR pattern changed with the onset of complicated variable decelerations.





Onset of recording at ~ at 07:10.
End recording at ~ at 02:10.

Assessment of recording

Neonatal outcome

Normal neonatal outcome.

Neonatal outcome

Neonatal data

Male: 3850 g
Apgar: 5-8-8
Cord artery: pH 6.92
PCO₂ 8.30 KPa
BDecf 17.6 mmol/l
Cord vein: pH 7.05
PCO₂ 7.30 KPa
BDecf 13.5 mmol/l

Mid cavity vacuum at 02:22 for failure to progress
Active pushing commenced at 01:30

Meconium. Augmented labor
Para 0. Normal pregnancy. Spontaneous onset of labour after 42 weeks of gestation

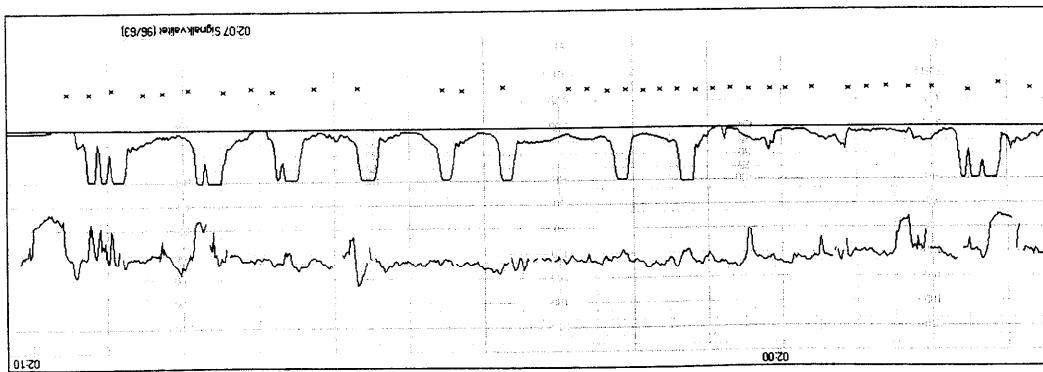
Clinical data

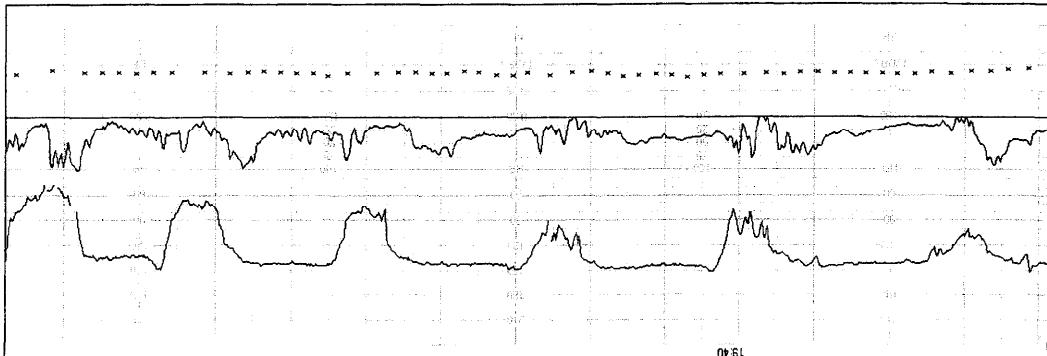
MAB 261

Nothing to indicate marked intrapartum hypoxia. Obviously, events after disconnection of recording – 12 minutes without data might have been the cause for the acidemia.

Comments

Frequent uterine contractions during active pushing in 2nd stage. Normal ST with variable deceleration occurring during end of 1st stage.





Normal FHR pattern until active pushing starts. At this point in time, variable decelerations commence. Normal baseline FHR.

Assessment of recording

Normal neonatal outcome.

Neonatal outcome

Female: Apgar: 4-8-9
Cord artery: pH 6.92
PCO₂ 12.18 kPa
BDecf 12.2 mmol/l
Cord vein: pH 6.98
PCO₂ 12.18 kPa
BDecf 11.9 mmol/l
Normal neonatal outcome.

Neonatal data

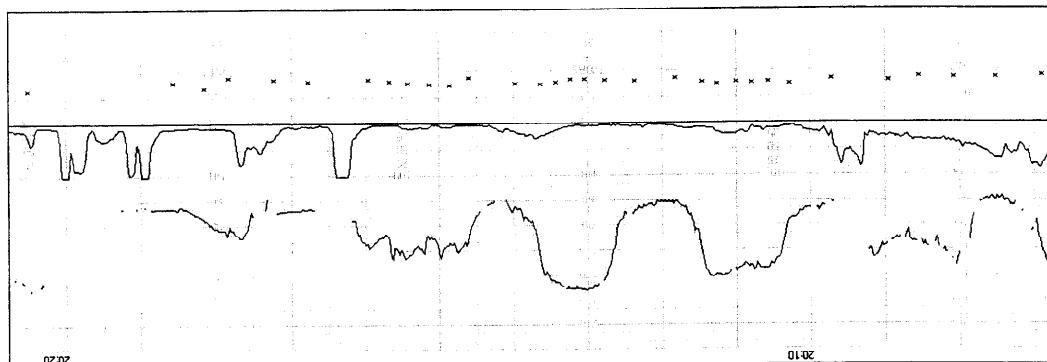
Para 1. Spontaneous onset of labour after 37 weeks of gestation,
Clear liquor
Active pushing commenced at 14:40
Outlet vacuum for three attempts asphyxia according to CTG+ST at 20:23.

MAD 213

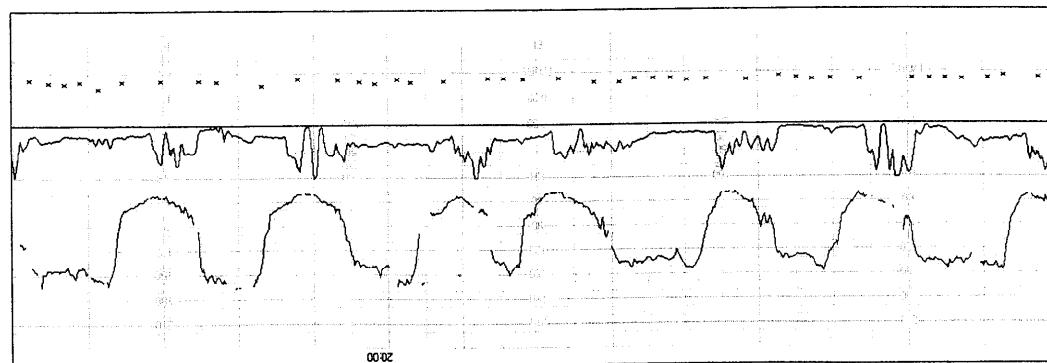
The staff responded accurately to the situation.

T/QRS data show an increase during the last 10 min of labor. Readings are associated with these decelerations and intermittent cord occlusions. The metabolic acidosis predominantly generated from blood flow and a Such patterns would be associated with a reduction of peripheral blood flow and a readjustments are associated with those tissues. The high PCO₂ Events occurring during 2nd stage of labor indicating intermittent cord compression.

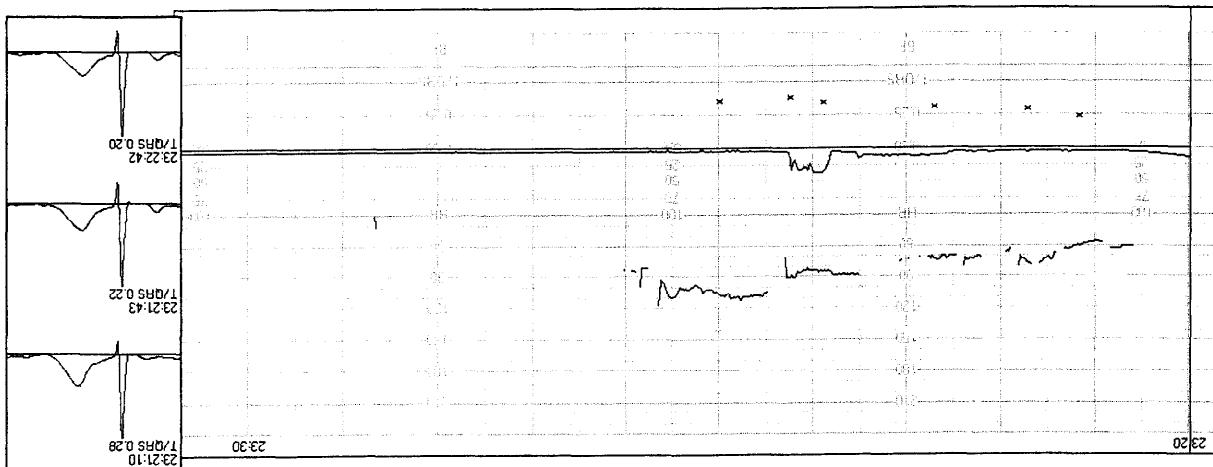
Comments



Final part of the recording ending 2 minutes before delivery.



Comments



before delivery.

Five minute recording during 2nd stage. Inadequate duration and finishing 18 min

Assessment of recording

Normal neonatal outcome.

Neonatal outcome

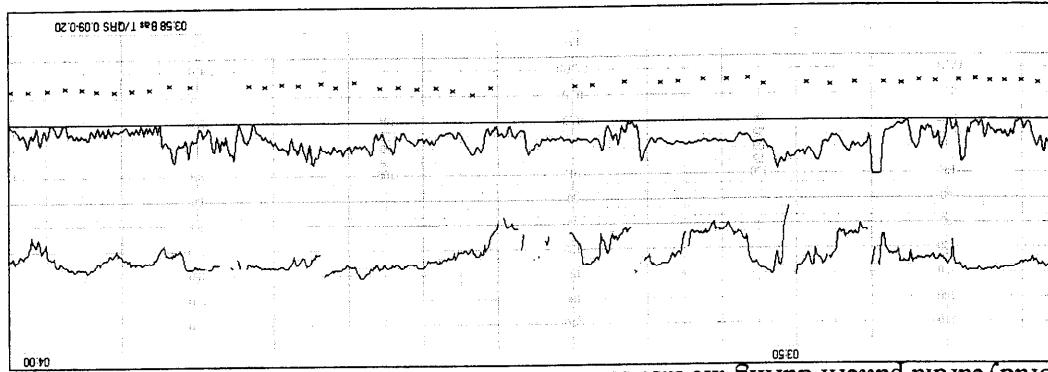
Male: 3370 g
APgar: 6-10-10
Cord artery: pH 6.93
PCO₂ 10.67 kPa
BDeCF 13.8 mmol/l
Cord vein: pH 7.13
PCO₂ 7.82 kPa
BDeCF 8.4 mmol/l

Neonatal data

Para 0. Normal pregnancy, Spontaneous onset of labour after 41 weeks of gestation
Clear liquor.
Active pushing commenced at 23:20
Mid cavity vacuum for threatening asphyxia according to CTG at 23:44

Clinical data

MAD 317



Normal FHR pattern until onset of active pushing. At this point in time, variable decelerations are noted, becoming complicated at 04:02. Baseline FHR shows a bradycardia pattern during the last 15 minutes.

Assessment of recording

Normal neonatal outcome.

Neonatal outcome

Male: 3960 g
APgar: 7-9-10
Cord artery: pH 7.02
PCO₂ 6.85 kPa
BDdecf 15.7 mmol/l
Cord vein: pH 7.17
PCO₂ 9.22 kPa
BDdecf 2.7 mmol/l

Neonatal data

Paras 1. Induction of labour for maternal reasons after 41 weeks of gestation
Clear liquor. TNS + Pethidine.
Active pushing commenced at 03:50
Outlet Vacuum for threatening asphyxia according to CTG+ST at 04:29

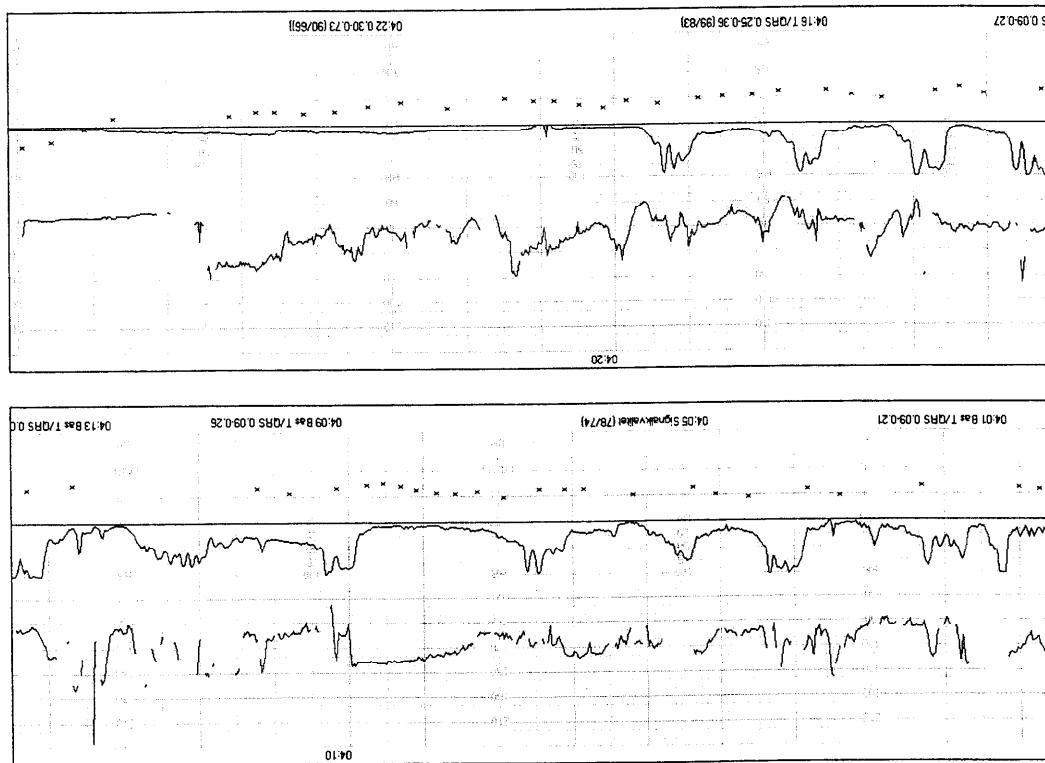
Clinical data

MAD 386

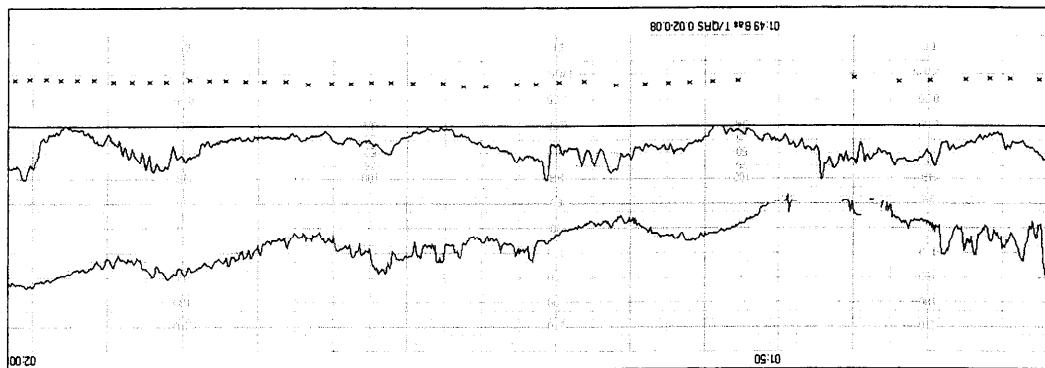
Firstly, one should notice that cord acid base data indicate late clamping with loss of PCO_2 from the cord artery (6.85 vs 9.22 kPa) thereby overestimating the degree of metabolic acidosis in the cord artery (BDeff 15.7 vs 2.7 mmol/L). Secondly, there was a delay in responding to the CTG+ST information by approx 20 minutes.

Comments

The ST log indicated a sign T/QRS rise at 03:38, (baseline T/QRS rise of 0.11) in association with an intermediate FHR pattern.



This pattern was repeated at approx 02:20 with the onset of active pushing.



Normal FHR pattern until 01:50 when a marked deceleration occurred in association with frequent contractions. A T/QRS baseline rise was indicated as well.

Assessment of recording

Normal neonatal outcome.

Neonatal outcome

Female: 3700 g
APgar: 6-8-10
PCO₂ 7.78 KPa
BDecf 15.4 mmol/l
Cord artery: PH 6.99
PCO₂ 9.71 KPa
BDecf 10.7 mmol/l
Cord vein: PH 7.02
PCO₂ 9.71 KPa
BDecf 10.7 mmol/l

Neonatal data

Paro 0. Normal pregnancy. Spontaneous onset of labour after 38 weeks of gestation
Clear liquor, Augmented labour. Epidural.
Active pushing commenced at 02:10
Outlet vacuum for threatening asphyxia according to CTG+ST at 03:28

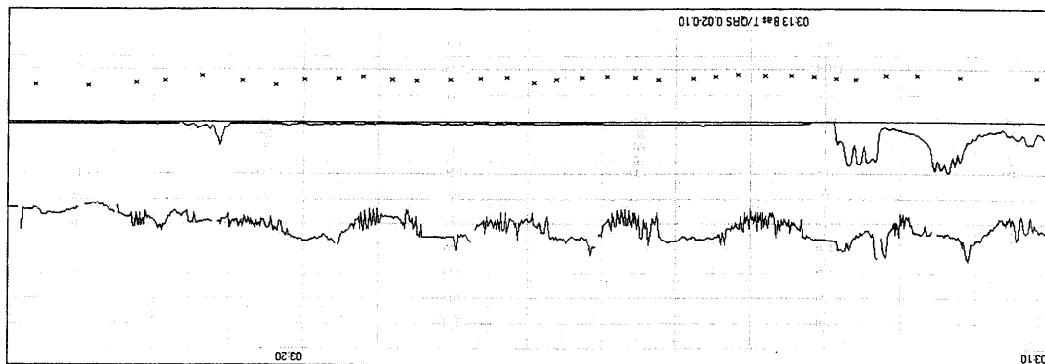
Clinical data

MAE 311

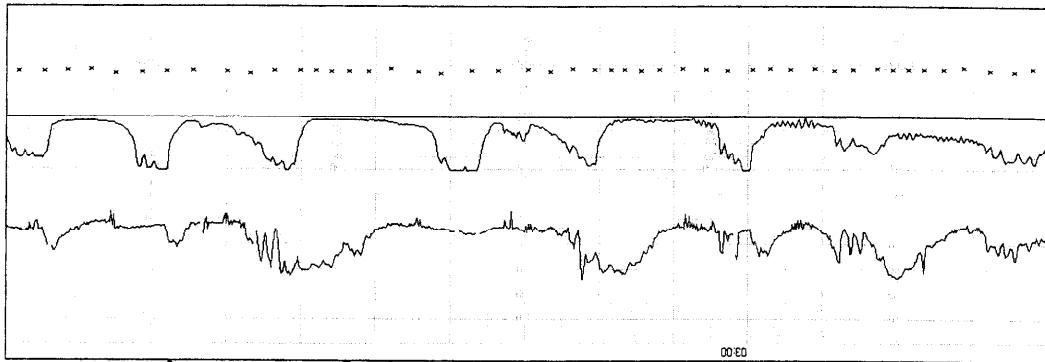
placental unit to meet with the demand of labor and an intervention was required. These initial events did not persist, they indicated a reduced ability of the fetal metabolism in responding to the cord artery (Bdecf 15.4 vs 10.7 mmol/L). Secondly, there was a delay in clamping the cord artery (7.78 vs 9.71 kPa) thereby overestimating the degree of metabolic acidosis in the cord artery (Bdecf 15.4 vs 10.7 mmol/L).

Firstly, one should notice that cord acid base data indicate late clamping with loss of

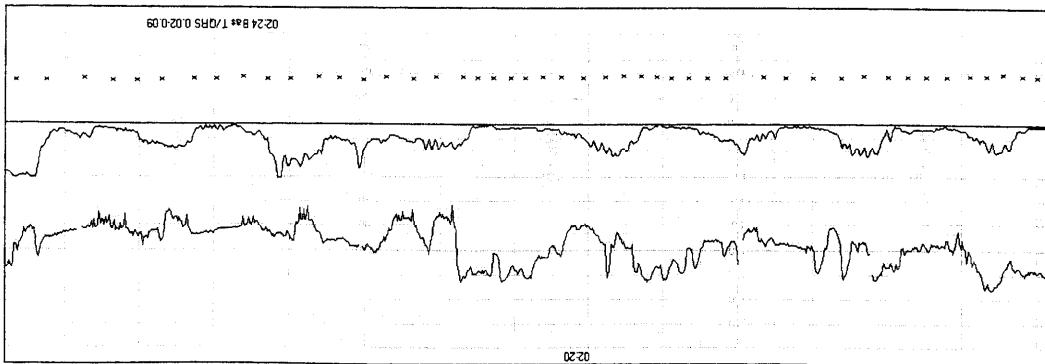
Comments

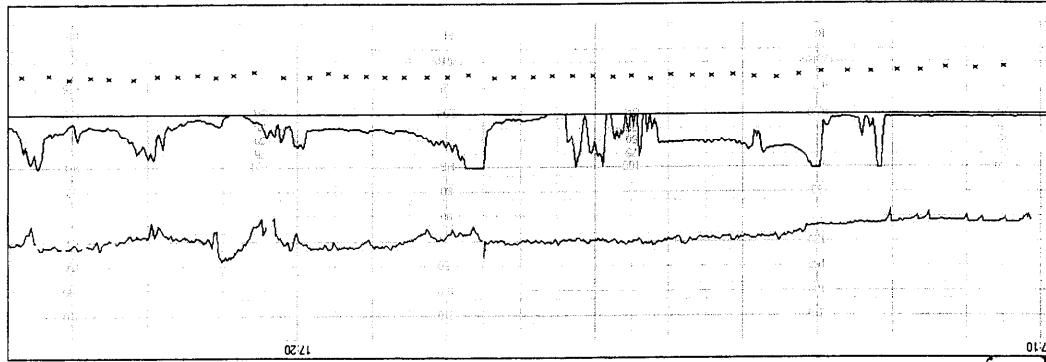


End recording showing persistent bradycardia with ST rise.



Thereafter late decelerations were recorded followed by a persistent bradycardia.





partly missed.

The recording starts with a bradycardia followed by a recovery in baseline FHR. In parallel there is a rise in T/QRS indicating a significant hypoxic episode that was partly missed.

Assessment of recording

Normal neonatal outcome.

Neonatal outcome

Male: 3655 g
APgar: 8-9-10
Cord artery: pH 7.01
PCO₂ 8.42 kPa
BDcef 13.4 mmol/l
Cord vein: pH 7.15
PCO₂ 6.04 kPa
BDcef 11.5 mmol/l

Neonatal data

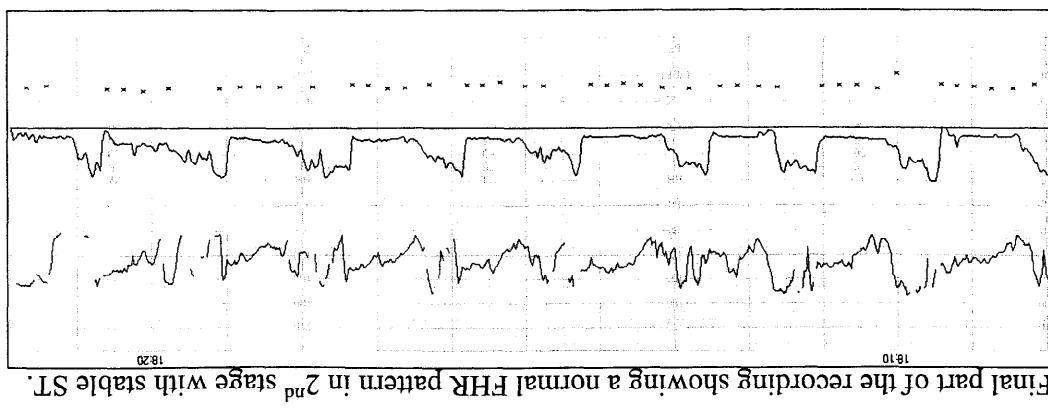
Normal vaginal delivery at 18:23.
Active pushing commenced at 17:30
Clear liquor, betahine, augmented labour.
Para 0. Normal pregnancy. Spontaneous onset of labour after 39 weeks of gestation

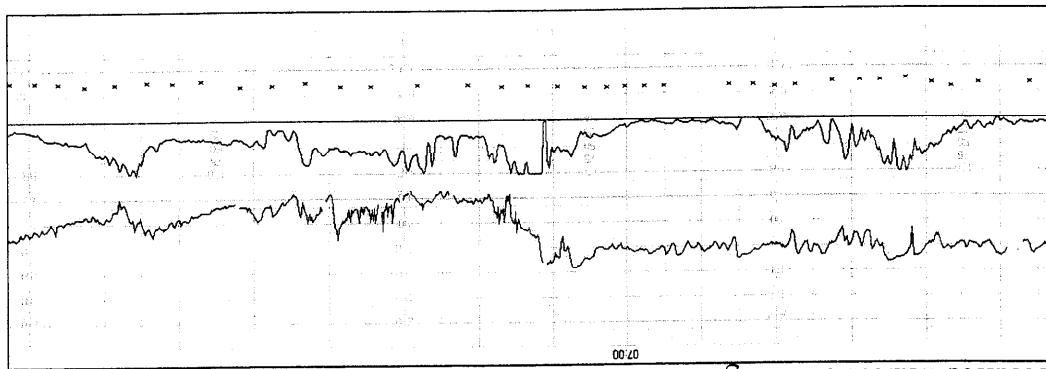
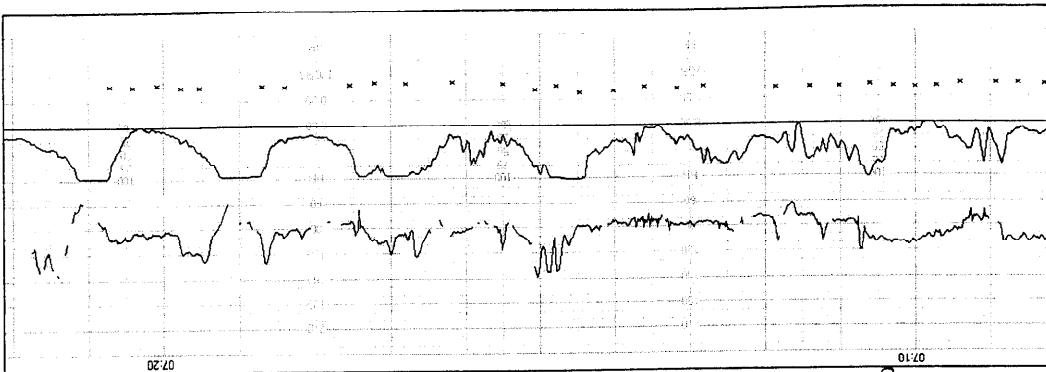
Clinical data

MAF 218

Comments

A case of cord artery metabolic acidosis and a vigorous neonate. CTG+ST indicates the possibility of some hypoxic episode at onset of recording.





Assessment of recording

Normal neonatal outcome.

Neonatal outcome

Male: 4015 g
APgar: 9-10-10
Cord artery: pH 6.95
Cord vein: pH 7.19
BDecc 12.1 mmol/l
PCO₂ 11.13 KPa
BDecc 5.8 mmol/l
PCO₂ 7.48 KPa

Neonatal data

Normal vaginal delivery at 07:25.

Active pushing commenced at 07:05.

Clear liquor

Para 1. Normal pregnancy. Spontaneous onset of labour after 39 weeks of gestation

Clinical data

OEE 307

Comments

A case of cord artery metabolic acidosis and a vigorous neonate. FHR changes illustrating some cord compression also indicated by the accumulation of CO₂. Normal ST.

OE 362 Clinical data

Para 0. Normal pregnancy. Spontaneous onset of labour after 39 weeks of gestation
Clear liquor, augmented labor.
Fetal scalp pH 7.30 at 17:15.

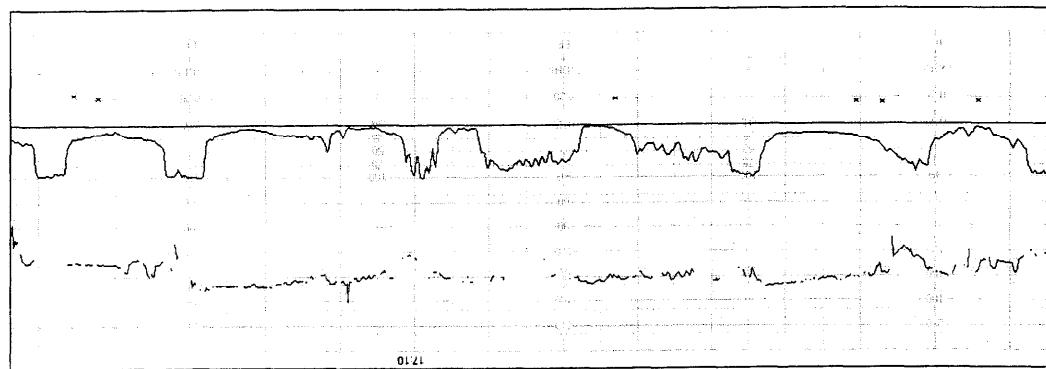
Normal vaginal delivery at 18:20
Active pushing commenced at 16:15

Male: 4215 g
Apgar: 7-8-8
Cord artery: pH 7.04
PCO₂ 7.80 KPa
BDeccf 13.1 mmol/L
Cord vein: pH 7.17
PCO₂ 6.25 KPa
BDeccf 10.0 mmol/L

Neonatal data

Normal neonatal outcome.
Neonatal outcome

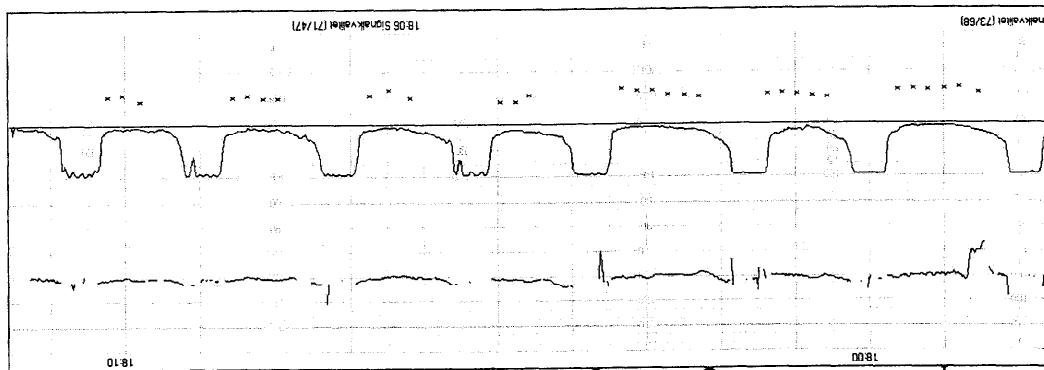
A recording of reduced quality. The first figure shows the FHR pattern in association with the scalp pH obtained at 17:15.
Assessment of recording



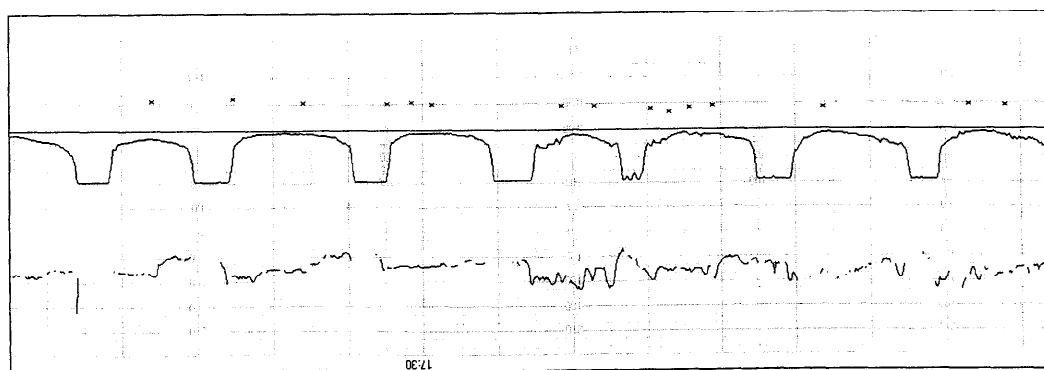
The FHR pattern showing a borderline tachycardia continued. Only intermittent ST data.

Second stage of labor lasting > 2 hrs and a large baby causing a need for metabolic adjustments and increase in sympathetic tone. Poor signal quality limiting the possibility for detailed assessment of ST waveform changes.

Comments



The last part of the recording finishing 9 minutes before delivery.



OEE 367

Clinical data

Para 0. Normal pregnancy. Spontaneous onset of labour after 40 weeks of gestation
 Clear liquor
 Active pushing commenced at 12:10
 Normal vaginal delivery at 13:00.

Neonatal data

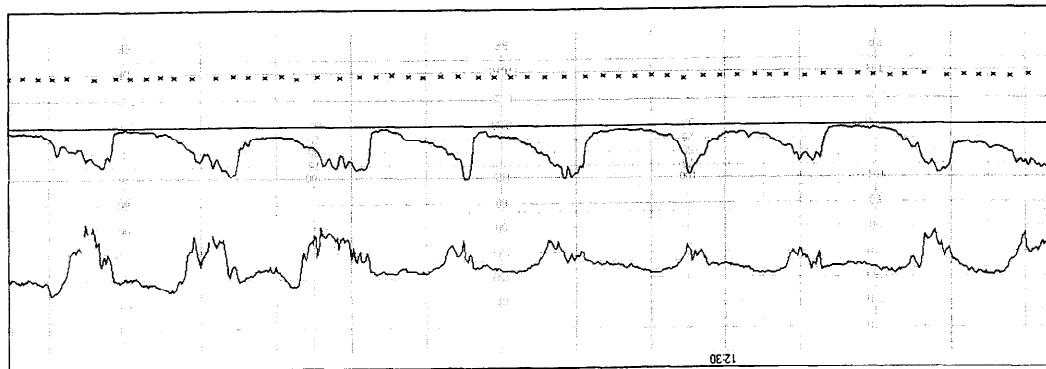
Female: 3670 g

Apgar: 6-9-10

Cord artery: pH 6.98
 PCO_2 8.31 kPa
 BBecf 15.0 mmol/L
 Cord vein: pH 7.18
 PCO_2 5.72 kPa
 BBdecf 10.8 mmol/L

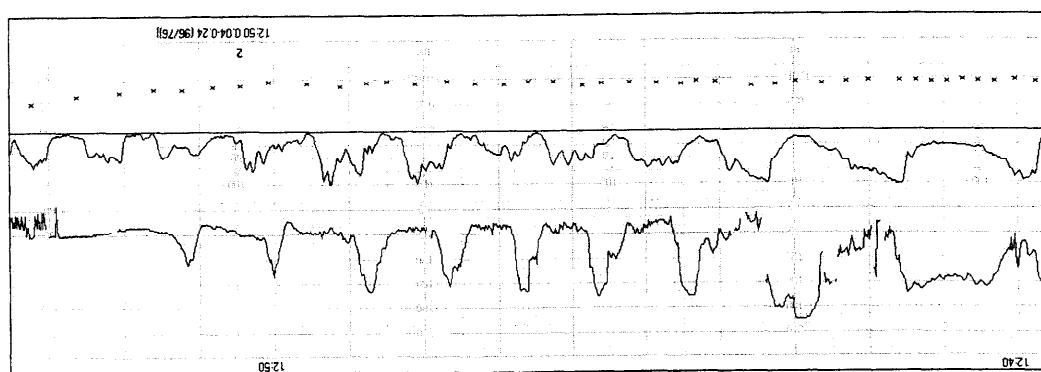
Neonatal outcome
 Normal neonatal outcome.

Assessment of recording
 Normal FHR pattern until last 20 min of the recording when marked variable decelerations start.



Uncomplicated acute hypoxia during the final part of 2nd stage.

Comments



Normal ST until the last 10 minutes where there is a marked rise in T/QRS.